knowing anything else, that's, that's my best guess is what happened.

Q Now, let me ask you this. Is there some way that RAM or anyone for that matter, could have taken that traffic from 151.10 and chained it -- I'm not exactly sure, but, but my question is, is there some way that RAM could have produced -- RAM could have produced that traffic on 152.480 that originated with Capitol's RCC channel?

A Could have produced the traffic --

Q Okay. In other words --

A -- we could not have produced that traffic. We could have done something like earlier, a repeating function whereas all the traffic comes up, but that's not what happened The packet lengths were different and, and some pages weren't in the second packet batch, so we could not have produced the traffic. We could have repeated the traffic, but that's not what happened because some of the traffic wasn't repeated.

Q In other word, it wasn't an identical --

A No.

Q -- copy of the -- it was random --

A From the, from the broader scope, it was not identical. In other words, out of 100 pages maybe only 20 came through on the second channel. So, it wasn't identical in that respect. But of the 20 pages, they were identical to the, to the original pages.

MS. LADEN: I have no further questions.

JUDGE CHACHKIN: Mr. Joyce?

CROSS-EXAMINATION

BY MR. JOYCE:

Q Mr. Bobbitt, 12 years with RAM Technologies?

A Yes, sir.

Q So, you were with Bob Moyer when he was in RCC as well?

A Yes, I was, during -- days.

Q So, you're familiar with the differences between RCC and PCP paging operations?

A Yes, sir.

Q From, from an operational/technical stand point, is the equipment basically the same for an RCC as it is for a private carrier paging?

A Virtually identical, yes.

Q And those pieces of equipment, we've heard a lot of testimony about it. Can you just tell me briefly what are your basic equipment in PCP and RCC paging?

A In RCC paging, since the license holder has sole use of a channel, the basic components as a telephony network first to allow subscribers to -- or to allow users to call a number that they have confidence the subscriber will receive the message. There's a telephony network side. There's a terminal which is basically a database and a bridge. It's a

bridge from telephony to radio frequency. It's a bridge from the channel -- from the RCC channel to the telephony network. It also provides --

Q I'm sorry. Go ahead.

A It also provides database and billing and management functions also, so that's the, the central core.

Q Okay, and before you move on, because we've been talking about terminals, no one has described one of these things to me. Is it bigger than a bread basket? How big is this thing?

A Some are, some are -- most are bigger, but some are smaller. They're, they're not very large gadgets. They, they range in size from a bread basket, let's say, or a rack-mounted unit, or a desk-top unit that has a hundred-subscriber capability maybe, up to a full-size refrigerator sized unit that might handle several thousand trunks and several thousand subscribers.

Q If you just had one frequency that -- if you're just operating on 152.40 RAM Technologies, how big is the terminal that you need for, you know, 5,000 paging units?

A Well, usually subscribers are based in memory and memory is very small so that's not usually a condition of size. Size is more of how many trunks do you need to answer, answer simultaneously and usually each circuit or trunk or telephone line takes an individual card inside of the

terminal. So, if you wanted to only answer two phone lines you wouldn't need much space at all. If you wanted to answer 200 phone lines, you would need considerably more space.

Q And then to, to program all these features into your paging unit to program chaining commands, this and that, you do that into this terminal? Is that how that works?

A Yes. That, that is the brains of the unit -- of, of the paging network.

Q I take it it has like a CRT monitor on top of it so you can see what the computer is doing.

A Usually, yes.

Q And a keyboard?

A Oh, yes. Some kind of input device.

Q And that would be in your office or, or Capitol's office for, for their operation?

A Yes, it would.

Q And these things very difficult to figure out how to use if you're in the paging business?

A Well, I guess there are various levels and I can use RAM as an example. We have customer service who does the actual keying in of subscriber data, verifying that it's accurate, that kind of thing. And then you had a little bit deeper layer where the technical people can get inside and do that. The first level is not very complicated, very little training, very -- to actually actuate a page, set it up

properly. It's very easy, very hard to make a mistake at that level. And then far deeper into the machine of course you need more expertise.

Q The -- you say that your customer representatives could actually operate one of these terminals. In RAM's case these are not necessarily engineers or college graduates?

A No, no, no. As a matter of fact, they're very, very unskilled as far as technology goes, individuals. They're customer service reps. Matter of fact, we, we don't want them to be technicians, we want them to be nice on the phone, to have a personality that many of us don't have from the technical background, that can actually talk and, and the warm and fuzzy is what you want there. And that's why the manufacturers make that front end so easy to use, because no one wants to have a technician standing there typing in the data, they want somebody that's -- if you have a billing question and you want to say why am I not getting a page in this area, they can answer the phone, make you feel comfortable, look up the data, and translate it into something that they understand. Oh, I see, you're not established in that zone, and, and set it up and make them feel happy and make it work.

Q Would one of those people be able to set up a chaining command in a pager?

A Usually, yes. That's a common function and, and you

could do that.

Q Go on. You were describing the various pieces of, of paging equipment. I interrupted you at terminals.

A Once the terminal gets enough data from the phone line to say okay, I know who I want to page and I know how I have to format the signal to make the pager go off and I know the information that the caller wants me to transfer to the pager, well, then the, the last link is the rf link which is all the transmitters, the antenna networks, the towers, all of that broad, wide area type system that, that actually generates the rf, that's actually licensed on the frequency. This is the equipment that actually generates the frequency that, that we make sure is on frequency and within power limits. That, that's where all that equipment is, is the rf network. Once the terminal decides or has enough information to format a packet or a page, then it -- we establish a link between the transmitters and the terminal through transmitter controllers that we say -- the terminal says, here's a page, Mister transmitter controller, now you distribute it to the 10 transmitters that need to go off or the one transmitter that needs to go off. And then that happens, it goes off, and then the last link is of course the pager itself.

Q The -- I asked you if a terminal is bigger than a bread basket. A transmitter, about what's the size of a transmitter?

A Transmitters are usually -- well, that's a hard question to answer also because of power. Low-power transmitters are obviously smaller than high-power transmitters. And so they would range from, again desk-top size which a transmitter for example in a two-way radio system would fit under your dash in your car and that transmitter might have a unit in the trunk that could generate 100 watts of power so it could be very small. A receiver and a transmitter controller and the little bit of management system there might be a little bit more -- so you might have two, two cubic feet of, of space, you know, a bread box or two, at a site to be an average transmitter. Or course, many of the larger ones are much larger than that.

Q The larger ones being the size of a refrigerator as opposed to a bread basket?

A I've never seen a transmitter in the RCC band that large. I've seen them in broadcast band that large that generate several thousand watts of power and require massive cooling systems. But usually in, in an RCC paging network or PCP paging network, they're virtually identical, the transmitter might be two foot tall, three foot tall, easily fit in a, in a 18-inch rack that's four foot tall by two foot deep.

Q Now, the, the transmitter, does it have to be near this terminal for, for your paging system as a basic setup for

it to work? How, how actually do you make that connection between the terminal and the transmitter?

A Not at all, and, and it's very rarely that it is. The two things that, that make it -- make them mutually exclusive as far as location is that, that usually the terminal is in a place where customers can get to, and that might be an office so that you can be close to it to manage it and, and maintain the database and that's where you're actually going to be your, your hub of operations. Transmitters, on the other hand, are much better suited to be on top of mountains that can see for miles around because that's -- the nature of RF, look, if I can get above everybody else and see as many people as I can the fewer transmitters I have to install.

Q So, then is there -- this -- we've heard discussion of a control link. Is that what's located in your office where the terminal is that connects you to those transmitters that are far away?

A Right. The control link is what establishes the connection between the terminal and the remote transmitters. And it can be rf, it can be land line, it can be satellite. Satellite is becoming more popular. But in our case, we use a combination of land line and radio.

Q And, and I, I guess it's possible that in some cases if, if Capitol's main office for instance happened to also be

located on top of a hill, it was in a good location for a transmitter, I mean the transmitter might also be on top of the roof top, I guess, right?

A Oh, yeah, yeah. It's, it's common to have maybe one transmitter close to your terminal. That's an engineering question.

Q On this PCP setup then, now RAM's operating on 152.48 and so is Capitol, correct?

A Yes.

Q So, they have -- they each have their own sets of, of terminals and transmitters. Is that correct?

A Yes, that's true.

Q Okay, and I presume that within both of those sets of equipment they, they have a card or they're programmed to operate on 152.48?

A Well, in the transmitter.

Q In the --

A You have a transmitter that's tuned to 152.48.

Q The, the terminal is sort of indifferent as to --

A The terminal doesn't mind.

Q I see.

A It's purely database and, and control as to which transmitter goes off, which one doesn't, which pages are sent to each transmitter. Purely a function of the terminal and the control system.

Q Okay. RAM had transmitters on 251.48 in a bunch of different locations, correct?

A That's true.

Q About how many?

A Well, it's, it's grown since the initial three or so to now it's about 17 I think.

Q Initial three in 1989 when you started?

A Right.

Q And the purpose of that is to expand your service area?

A Right. You want to provide a, a nice blanket of coverage so that your subscribers -- again, since paging is not a, a 100-percent -- no RF is 100 percent reliable, you want to provide as, as nice and smooth blanket of coverage as you can so the subscribers can travel about freely with a high level of confidence that they'll receive their message.

Q And, and where are Capitol's transmitters located, if you know?

A Exactly, I don't know. I mean, I know that they have a service area in Charleston, downtown Charleston, West Virginia, and one in Huntington, West Virginia. The physical location of the transmitter I've never, never worried about exactly where it was.

Q The interference that you detected, where was that occurring?

A In the Charleston downtown area and region, and in the Huntington, West Virginia are also.

Q You're aware of the fact that Capitol operates an RCC paging system?

A Yes, I am.

Q You had mentioned earlier, I believe you had referred to their channel as 152.10. Is it possible that you were mistaken, that it's actually 152.510?

A Yeah, it's very possible.

Q Is it -- I think that those two reports in front of you there, one of them has a frequency written on the top of it. Do you see that?

A Yes, yes.

Q And what is that?

A 152.51.

Q Does that reflect your recollection of the --

A Yes, yes. I don't recall saying 152.10, but I may have.

Q Okay. So, that that is Capitol's frequency, the RCC frequency?

A I believe it is.

Q Now, Capitol's -- to, to your knowledge, Capitol's RCC operation was -- or if you know, was it outside of Charleston and Huntington, was it a broader service area than just those two transmitters?

A I don't --

Q Okay. The, the interference, going back to the fall of 1990, was -- this interference that you were detecting, was it actually interfering with RAM's paging operations?

A Yes, it was.

Q And how so?

A Well, I again, as a, as a shared channel, then we, we certainly want to use the channel efficiently and respect the other person's rights to have, have air time. On the other hand, if that's not a mutual agreement, then any two, two signals that are on the air at the same time are going to detriment each other. In this case, in 1990, there was no consideration for when the RAM transmitters were on the air and therefore in the Charleston area -- I don't believe in the Huntington area in 1990 -- in the Charleston area receivers could not determine which signal was meant for them and therefore wouldn't go off, there were two, two transmitters going off at once, two signals.

Q When you say -- so, you mean customers weren't getting their pages during this period?

A That's right. That's right.

Q Did, did anybody call up and complain about that?

A Yes, they did.

Q Did any customers leave RAM's service as a result of that?

A I'm sure there were but I can't think of any specific ones.

Q Did -- as you were listening to the, the stereo sound, etc., etc., were you able to detect any actual Capitol pages going out?

A No, no, I don't believe that there was -- we had a method at the time to determine that the digital traffic was Capitol's other than the, the Capitol channel identified via Morse code that it was the Capitol call sign and that the traffic sounded identical on the PCP channel. And therefore we determined -- you know, we thought that it, it was -- as a matter of fact, it was identifying on both channels as the Capitol call sign.

Q Was that interference for just a couple minutes one day?

A Well, the, the various types of interference have lasted for various -- for several years on and off. Now, in 1990, my recollection was I don't know exactly how long it went on because I don't monitor the channel 24 hours a day. But I, I can say that when it was brought to our attention that we're having a problem that the technical staff rallied about the problem and monitored the channel for hours and hours and hours.

Q Was that just one day hours and hours?

A No, that was several days, several weeks.

Q Ms. Laden and you talked about using the Hark verifier to monitor interference subject to that, but I don't believe you, you explained exactly what the interference was following the fall of 1990.

A Well, there was a period of testing -- what, what we understand now to be -- was testing that we considered to be interference because it had no message content, served no purpose.

Q Who, who told you that someone was testing?

A Capitol. The response to our complaint was that they were testing the channels.

Q But nobody at Capitol ever -- or you never spoke to somebody at Capitol who actually told you that, that --

A Personally, I've never spoken with Capitol on any of these issues.

Q Did the -- did it appear to be legitimate what you would call in your experience testing?

A Not at all.

Q What was it?

A It was just sequentially the same page going out over and over and over again for hours and days at a time.

Q Did that cause a problem for your operations?

A Yes, it did.

Q How so?

A Well, again, at that time we were monitoring the

channel and we were -- our legitimate traffic in my mind was being held up because of this congestion on the channel so customers were complaining vehemently that it was taking 10, 30 -- an hour long to get messages. In other words, messages were coming in to the system faster than they could be distributed and they were, they were thinking they weren't getting messages, regenerating new messages which compounded the problem and it just went -- you know, went to hell in a hat basket. It just was, it just was terrible.

Q You, you've been with RAM since the good old days when it was an RCC or under a different name I guess in PCP, would -- and now that it's a PCP, in that first year or two in 1989, 1990, would you say that the growth of the customer base was, was, was pretty good? How would you describe that?

A Yes, very good. Very successful in, in applying a wide-area scheme, a wide-area solution, that, that was quality solution. We had built systems using various manufacturers' equipment throughout those years and in the 1989 build of the 152.48 channel we went with what we considered to be the best transmitting equipment on the market, the Quintrons, the best terminal that gave us the, the most flexibility that we were confident in we could -- that we could maintain and, and, and be very reliable, and, and a scheme that allowed us to cover much more geographic area than we had in the past. And with those, with those factors we were very successful in launching

a new paging business.

Q Is, is operating in a shared frequency environment difficult when one of the other licensees don't have very good equipment?

A It's, it's virtually impossible. It, it is very difficult is, is a mild term. Once a page is generated, if it doesn't reach the pager reliably, it's, it's forever corrupted and gone. So, it's, it's imperative that all of the participants realize that and in good faith try to keep a clean channel operating.

Q Could any of those pieces of equipment that you described earlier, the, the terminal, the transmitter, the antenna, the rf system, any weak links in that, would that cause a problem in a share frequency environment?

A They're all, they're all potentially weak links, yes. Any of them, if, if you're not tuned to the requirements of PCP and what you need to do to be a good player and -- or dedicated to being a good player, they're all weak links. They're all -- they all pose a potential for causing a problem to the other co-licensees.

Q Did you have a problem with any shared licensees other than Capitol during this time period?

A Well, minor problems. As we grew into areas and -- sure. You know, as with any growth system, minor problems come up. But the question is, do you respond quickly and do

you resolve the problems. And we, we have in every case except the Capitol case.

Q In, in those cases where you had interference, did you have any reason to believe it was intentionally interference, those other case you were referring to?

A No, no, not at all. University of Kentucky in Lexington, a very good player. Co-licensee, we worked out the, the differences. We worked out a system where we could hear each other's transmitters. We, we share the channel effectively.

Q So, in other words when you say there were minor problems, in a shared frequency environment when people are building separate systems and they're operating on a shared frequency, you know, even with the best of intentions every once in a while you're going to have some interference?

A That's true. I, I think that's fair to say that new equipment might break, engineers might not see things eye-to-eye and need to sit down and work it out, yes.

Q The problems that you had with the University of Kentucky, were there anything on the order of the problems you were having with what appeared to be Capitol transmissions?

A Oh, not at all, not at all. Number -- first all, University of Kentucky had been in the, in the shared frequency business for a while and they understood, although hesitantly, that they, that they was going to not have quite

as much channel time as they were used to and therefore after a meeting or so we realized that we're going to have to share the channel, they're going to have to share the channel, let's do it in a way that, that, that everyone receives their pages even if they're a little late, and that's the whole idea behind PCP co-channel share.

Q So, so, RAM was willing to, to accept the possible delays from sharing that frequency with other licensees?

A Absolutely. That's, that's a given.

Q I was asking you about the, the rapid growth of, or RAM's system. At the time that this interference was occurring in the fall of 1990 and then the following year, would you say that RAM's amount of traffic on 152.48 was, was fairly heavy?

A Growing quickly, yes. Very heavy.

Q And do you as a means of measurement -- I mean, broadcasting channels, I can turn on a TV and a busy TV station I guess, Channel 4, has 24-hour programming. By analogy, a busy PCP frequency I presume is one that has paging traffic 60 seconds every minute, I mean that's obviously 100-percent busy?

A Yes. We were, we were at the time approaching 45, 50 minutes an hour.

Q So, with that amount of traffic, if, if somebody is causing interference for, you know, one minute, two minutes,

three minutes, would that have a fairly adverse impact on your operations?

A Well, again, if it's channel traffic, that's, that's not -- a two-minute delay is not excessive. If it's interference where we're transmitting and two minute's worth of customers don't get pages, at that level of loading that could be hundreds of customers, then that's significant.

Q You had mentioned when you were talking about these paging terminals that a customer-service rep could enter a zoning code in that. Does that mean if, if you've got a wide-area system with a bunch of different transmitters that you could enter in a code so that one customer might get service only in a smaller zone? Is that what you meant?

A That's true, that's true. The terminal has the ability to control each transmitter individually if that's how it's designed so that it would be possible for us to establish a customer that only received Lexington pages. So, he must be under the umbrella of the Lexington transmitter system to receive a page while at the same time someone else's page is going off in Charleston, West Virginia.

Q So, if Capitol was interested in providing service to its customers in a smaller area they'd have that capability of doing it too, just typing in some zoning code in their terminal?

A Most of the terminals support that, and the

Commonwealth certainly does.

Q Is there a legitimate purpose for a chain command?

A Yes, there is.

Q What would that be?

A Imagine a volunteer fire department and the, the chief gets an alarm and wants to page a dozen volunteers who may be anywhere in the region. A legitimate chaining sequence might be that the chief only needs to dial one number as opposed to 12 numbers to set off a page. And he could dial the first number of the chain and put in his fire code and that message would be transmitted, bam, bam, bam, bam, bam, right down the line automatically and set off all 12 pagers.

Q Now, I presume that that fire chief is dealing with one paging system.

A Yes.

Q So, all those -- the firemen out there are carrying around beepers that are operating on the same frequency?

A That's right. That's right. And they're cap code coordinated also.

Q Would there be a legitimate reason why somebody would enter a chaining command with more than one frequency?

A I can't imagine why there might be a legitimate reason, but I've never had to solve a problem like that.

Q And when you enter this chaining command, the expectation is that there is a customer walking around there

on that particular frequency with that particular cap code is going to receive that?

A Yes, yes. A message is not a message unless it has a recipient intended for it.

Q So, it Capitol was entering chaining codes on its 152.510 pagers, and also had some legitimate reason to chain another page on 152.48, you would expect that there would be a Capitol customer on 152.48 receiving that message, right?

A Yes, but I wouldn't expect that same customer to be on 152.51. It would be exclusive. It would be one channel or the other, but not both.

Q And your reports show that, I mean it's, it's basically kind of silly. I mean, it would mean somebody is carrying around two beepers side-by-side.

A Yes.

Q There wouldn't be any legitimate reason for doing that.

A That's right. None, none whatsoever.

Q You get beeped on the RCC channel, no point in getting -- having a side-by-side beeper get beeped at the same time on a different system.

A That's true, that's true. Both beepers would go off at virtually -- you know, virtually the same time. I, I can't -- any reason why someone would want to carry two pagers.

Q They'd also be -- they'd be paying Capitol twice,

presumably, right?

A Reliability, maybe, but you could carry two on the same frequency. I don't, I don't see any legitimate reason.

Q If they're on -- if they are carrying -- hate to beat a dead horse on this, but just to eliminate all possible scenarios, they're carrying an RCC beeper which is a clear channel, then they're carrying the PCP which is a shared frequency and presumably Capitol would be charging them monthly fees for both, correct?

A I would presume that they would.

Q When you're doing this testing, you, you were with Luke Blatt doing this Hark verifier testing. Is that correct?

A Usually in the Ashland area and occasionally out on the road.

Q Did you ever identify any -- either when you were using the, the verifier or just from discussions with salespeople or anything, did you ever identify any Capitol customers on 152.48 associated with any of those pagers?

A No, I don't -- I never found a single legitimate 152.48 Capitol customer, ever.

Q You mean from the day that, that RAM stated operating on 152.48 back in 1989 until the present?

A I've never identified one. Of course, there, there be, but I've never identified one, and there were never any indications that any of these pages received -- were received

by valid Capitol customers on 152.48 frequency.

Q You mentioned that the time between the 152.510 page report and the 152.40 -- identical pages showing on, on -- one on the other, you said the time is virtually the same but not exactly the same. Is that correct?

A I think I said they weren't simultaneous, but they were very close together. Within seconds or minutes.

Q How would you explain that, that there might be a time delay between the two?

A Could be one transmitter on two frequencies. So, in other words, you'd have to send out a page, the transmitter would shift to another frequency, send the page out again, send out a batch of pages, shift to the other frequency, send out a batch again, some delay there. Might be in the terminal -- and I, I, I don't know how Capitol's system is designed -- might be in the terminal that there were two channels assigned and that pages were being buffered and, and managed at different times. And that's purely a function of the, the control network and the, the terminal itself at that point.

Q You're saying -- when you say terminal, you're saying Capitol's terminal?

A Yes, Capitol's terminal. If it decides to wait for 50 pages before it generates a batch and send them out, then it's entirely up to the terminal. So, I, I can't, I can't say definitively why the delay was other than it was on separate

channels and there are several variables that could, could have been -- that, that could apply to the difference in time.

Q Could, could the delay also have been because of a batch of pages just sitting in, in RAM's terminal when those transmissions came out or is that not also a possibility?

A That is a very good possibility. If, if they're monitoring the channel properly as a co-channel should, then if RAM's terminal's transmitter is on the air, then it would be, it would be proper to wait until that transmission ceased and then initiate the second transmission from the second system. And then RAM would be held in queue until that system goes off the air and RAM would transmit. So, this delay might very well have been caused by RAM's system being on the air, Capitol queuing as they should, and then when RAM ceased to transmit Capitol comes on the air.

Q You, you have in front of you I believe two stacks of documents. Are those the Hark verifier reports that you've been referring to?

A Photocopies of them, yes.

Q Okay. They're, they're not the originals?

A No, they're not.

Q What would the original look like? Would it look different from those?

A Virtually the same.

Q It, it was --

A It was a fan-fold stack of paper that was placed under each dot-matrix printer and they came out so it would have been a continuous form with tractor feet up the side and you could have told it was the original because of the dot-matrix imprint, but other than that it would be exactly the same. That one looks like it's been reduced a little, but --

Q I don't have those in, in front of me, Mr. Bobbitt, but if you would take a look at them, bring them closer to you. What I'd like you to do is to, to give us an idea putting the two frequencies side-by-side and reading from left to, to right, just pick any incident there where you see a 152.510 frequency on one report and you see it show up on the 152.480 report and if you would read it from left to right to identify it for us why you think that they're identical pages.

Q Well, on the 152.510 frequency, the, the page that, that Mr. Blatt and I marked we simultaneously read these and tried to find matches and found several and marked them for ease of reference. The page marked number 1, the cap code was 0002582, address 3, on the 152.51 channel, and the cap code was 0002582, address 3, on the PCP channel also, which a cap code is destined for one pager usually, that's not to say exclusively, but that indicated that this page was meant for one pager. The message -- which the verifier doesn't try to interpret the data. The verifier only receives the channel